A NiSource Company

801 E. 86th Avenue
Merrillville, IN 46410

April 20, 2000

Mr. William Grimley
Emission Measurement Center (MD-19)
U.S. Environmental Protection Agency
Research Triangle Park, North Carolina 27711
Attn: Electric Utility Steam Generating Unit Mercury Test Program

Dear Mr. Grimley:

Please find enclosed three (3) copies of the following:

Speciated Mercury Emissions Testing report, for the testing conducted at Northern Indiana Public Service's Bailly Generating Station, Units 7 and 8.

Please contact Brian Stage of my staff (219-647-5255, or bstage@nipsco.com) if there are questions regarding our report.

Sincerely,

Arthur E. Smith, Jr.
Environmental Officer and Counsel

Enclosures

AES:BRS

File: Mercury ICR-Part III
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SPECIATED MERCURY EMISSIONS TESTING

Performed For
ELECTRIC POWER RESEARCH INSTITUTE

At The
Northern Indiana Public Service Company
Bailly Generating Station
Units 7 and 8
Precipitator Outlets and Common Scrubber Stack
Chesterton, Indiana

December 9 and 10, 1999

Mostardi Platt

Mostardi-Platt Associates, Inc.
A Full-Service
Environmental Consulting
Company

945 Oaklawn Avenue
Elmhurst, Illinois 60126-1012
Phone 630-993-9000
Facsimile 630-993-9017

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Chesterton, Indiana
December 9 and 10, 1999

MOSTARDI PLATT PROJECT 94912
DATE SUBMITTED: APRIL 18, 2000

TABLE OF CONTENTS

TABLE OF TABLES

TABLE OF FIGURES

CERTIFICATION SHEET

Having supervised and worked on the test program described in this report, and having written this report, I hereby certify the data, information, and results in this report to be accurate and true according to the methods and procedures used.

Data collected under the supervision of others is included in this report and is presumed to have been gathered in accordance with recognized standards.

MOSTARDI-PLATT ASSOCIATES, INC.

James R. Platt
Vice President, Emissions Services

Reviewed by:

Frank H. Jarke
Manager, Analytical and Quality Assurance

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1.0 INTRODUCTION

1.1 Summary of Test Program

The United States Environmental Protection Agency (USEPA), is using its authority under section 114 of the Clean Air Act, as amended, to require that selected coal-fired utility steam generating units provide certain information that will allow the USEPA to calculate the annual mercury emissions from each unit. This information will assist the USEPA Administrator in determining whether it is appropriate and necessary to regulate emissions of Hazardous Air Pollutants (HAPs) from electric utility steam generating units. The Emission Measurement Branch (EMB) of the Office of Air Quality Planning and Standards (OAQPS) oversees the emission measurement activities. MOSTARDI-PLATT ASSOCIATES, INC. (Mostardi Platt) conducted the mercury emission measurements.

The USEPA selected the Bailly Generating Station of Northern Indiana Public Service Company (NIPSCO) in Chesterton, Indiana to be one of seventy-eight coal-fired utility steam generating units to conduct mercury emissions measurements. Although the USEPA only required testing at one unit, NIPSCO elected to test units 7 and 8 since both share the common FGD system. Testing was performed on December 9 and 10, 1999. Simultaneous measurements were conducted at the Precipitator Outlets and Common Scrubber Stack. Mercury emissions were speciated into elemental, oxidized, and particle-bound mercury using the Ontario-Hydro test method. Fuel samples were also collected concurrently with Ontario-Hydro samples in order to determine fuel mercury content.

1.2 Key Personnel

The key personnel who coordinated the test program and their telephone numbers are:

- Mostardi Platt Vice President, James Platt 630-993-9000
- NIPSCO Plant Coordinator, Steve Barnes 219-647-5371
- EPRI Project Manager, Paul Chu 650-855-2812

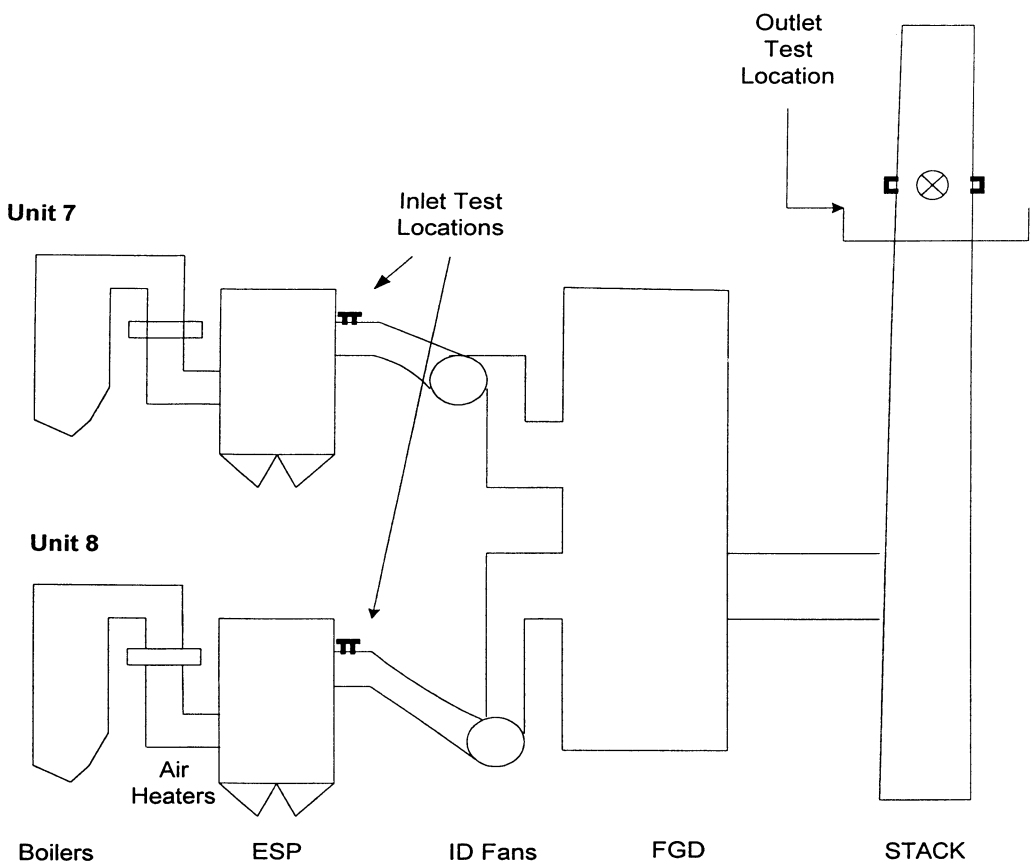
2.0 PLANT AND SAMPLING LOCATION DESCRIPTIONS

2.1 Process Description

Bailly Units 7 and 8 are cyclone fired, balanced draft boilers with ratings of 160 (net) and 320 (net) MW, respectively. Figure 2-1 shows a schematic of the boiler and pollution control equipment, including sample points.

Both units are coal burning steam boilers. The steam is converted into mechanical energy by flowing through a turbine (generator) which produces electrical power. The units were operated at or near full load during the tests. Fuel type, boiler operation and control device operation were maintained at normal operating conditions.

Figure 2-1 Facility Process Flow Diagram



The following is a list of operating components for this unit:

- Babcock & Wilcox, cyclone fired

- Unit 7 - 160 MW (net) capacity
  Unit 8 - 320 MW (net) capacity

- Unit 7 Fuel:
  Southern Illinois Bituminous Coal, 3.0% Sulfur
  Wyoming Bituminous Coal, <1% Sulfur
  Biomass
  Petroleum Coke

- Unit 8 Fuel:
  Southern Illinois Bituminous Coal, 3.0% Sulfur
  Wyoming Bituminous Coal, <1% Sulfur

- SO_2 control: Pure Air Inc. Wet Flue Gas Desulfurization System (common to both units)
- NO_X control: None

2.2 Control Equipment Description

Particulate emissions from both boilers are controlled by Wheelabrator-Frye, Inc. electrostatic precipitators with estimated collection efficiencies of 99.5%. Sulfur dioxide emissions are controlled by a common wet flue gas desulfurization system with a 90% removal efficiency.

2.3 Flue Gas Sampling Locations

2.3.1 Inlet Locations

Inlet samples were taken at each unit's precipitator outlet duct (two (2) locations) prior to them merging into one (1) FGD inlet duct. Schematics and cross-sections of the inlet ducts are shown in Figure 2-2. Both locations meet the requirements of USEPA Method 1.

2.3.2 Outlet Location

Outlet samples were collected at the FGD stack sample ports. A schematic and cross section of the stack location is shown in Figure 2-3. This location meets the requirements of USEPA Method 1.

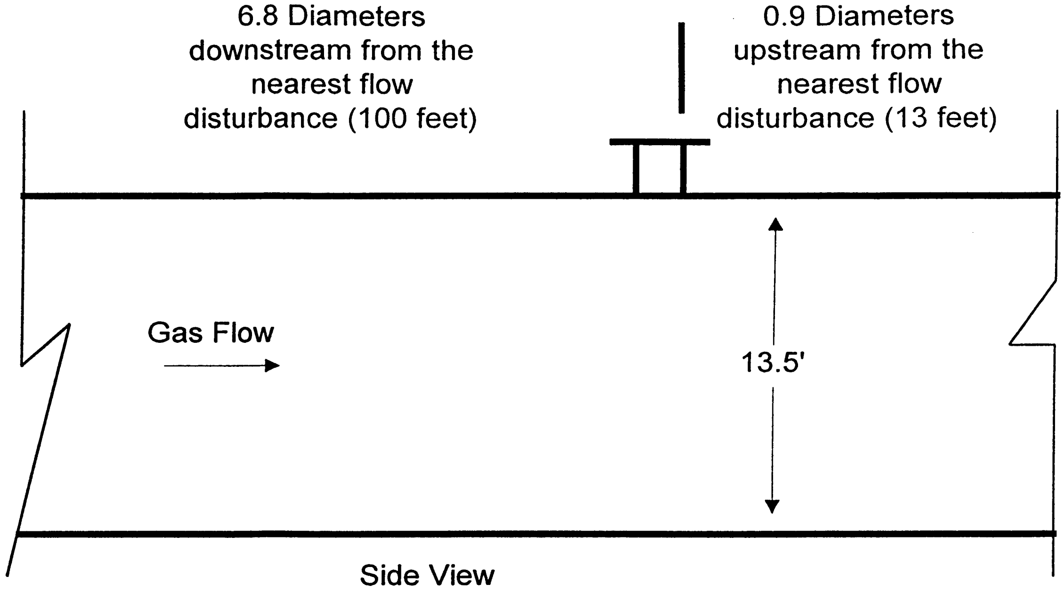
The flue gas at the outlet was below the method specification of a minimum filtration temperature of 120°C. Therefore, out of stack filtration per Method 5 was used.

2.4 Fuel Sampling Location

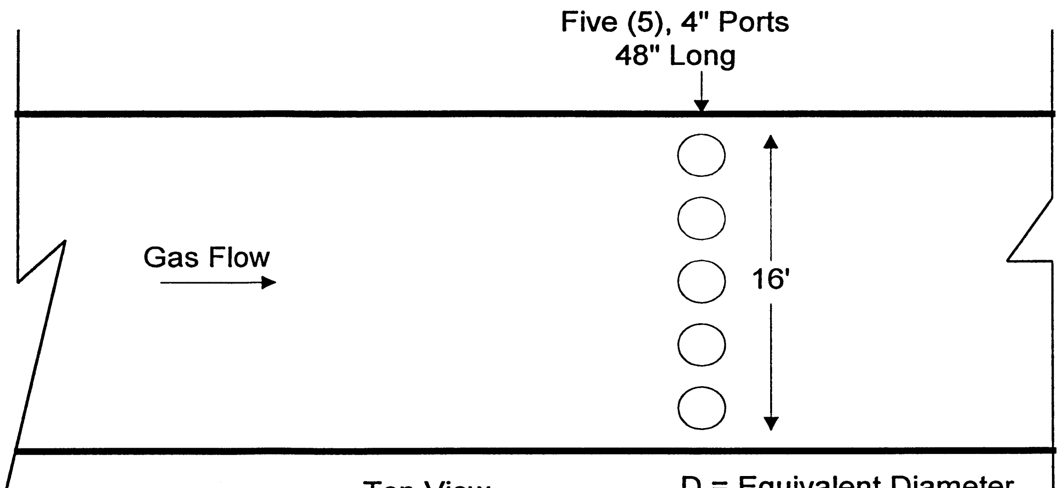
Fuel samples were collected at the fuel feeders to each individual cyclone. One sample was collected from each feeder during each test run, and the feeder samples collected during a test run were composited prior to analysis. The Mostardi-Platt test crew supervisor assisted plant personnel with the collection of fuel samples.

Figure 2-2 Schematic of the Bailly Generating Station Inlet Sampling Locations

UNIT 7



Side View



Top View

D = Equivalent Diameter

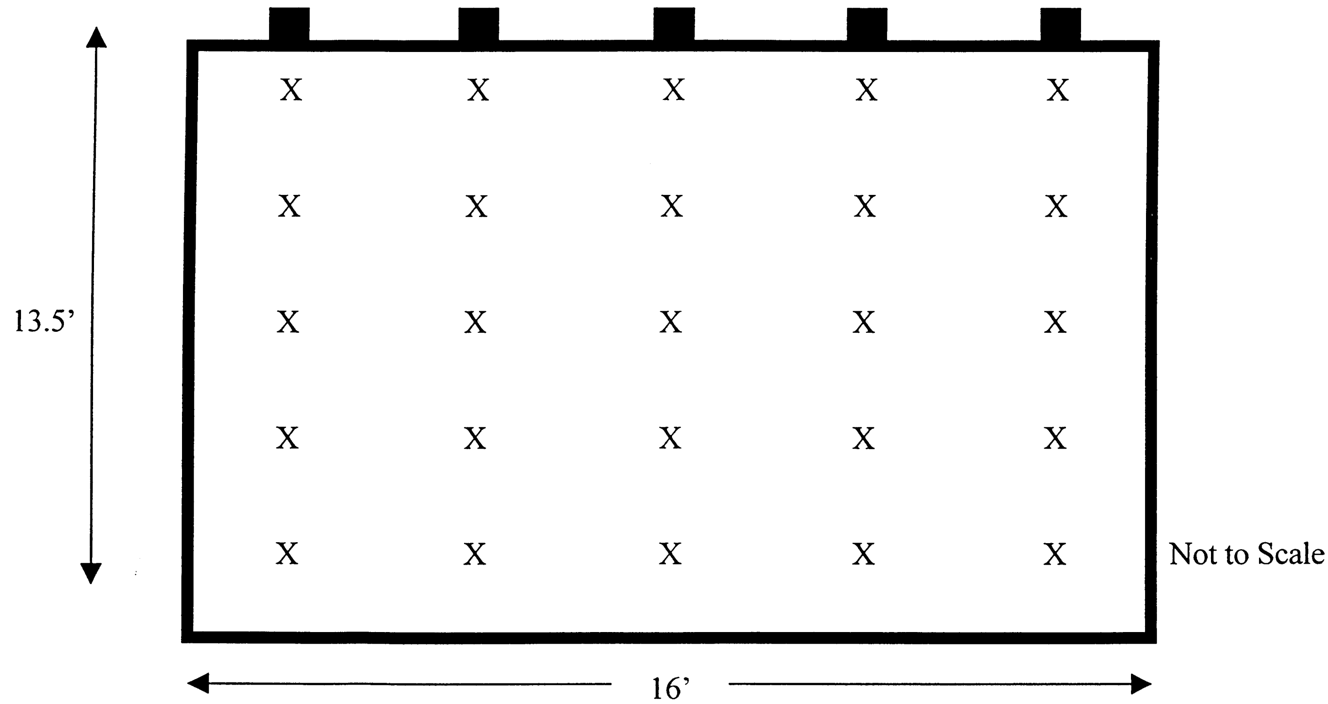
$$D = \frac{2 \times L \times W}{L + W}$$

$$D = \frac{2 \times 13.5 \times 16}{13.5 + 16}$$

$$D = 14.6$$

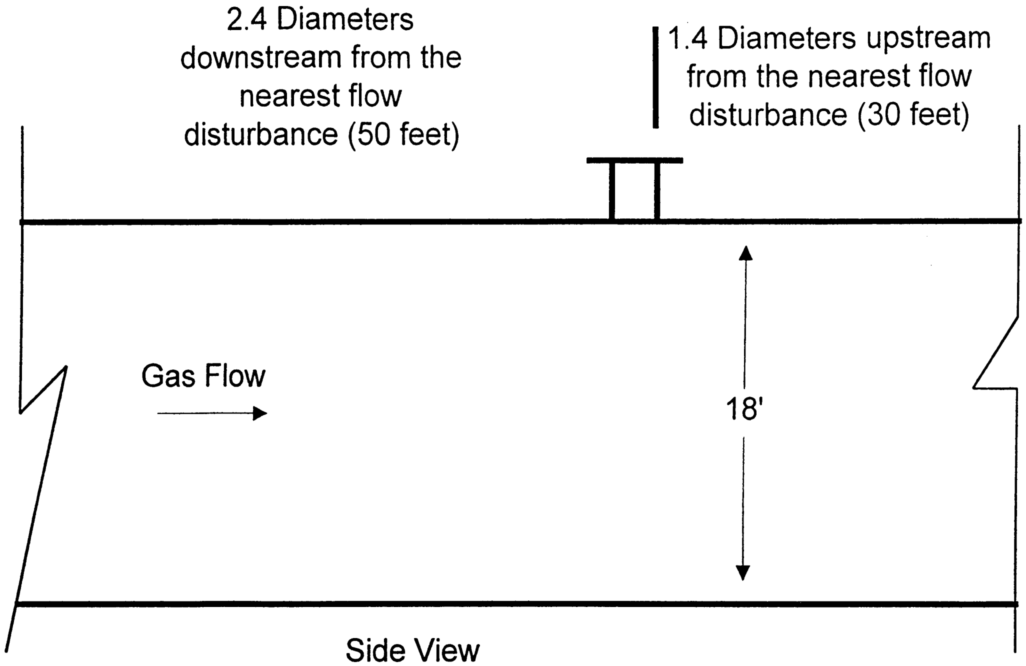
Not to Scale

Equal Area Traverse For Rectangular Ducts (Inlet)

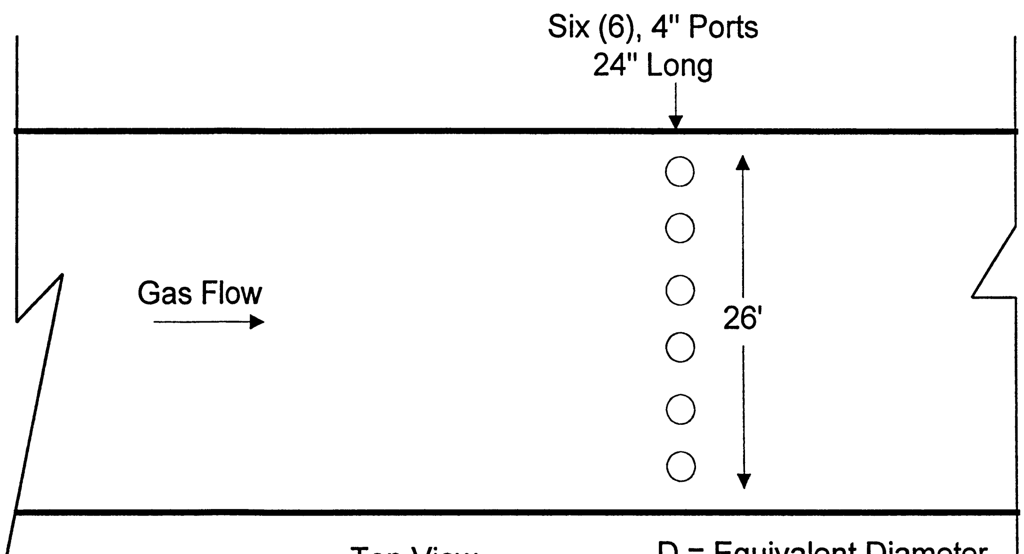


Job:	Northern Indiana Public Service Company Bailly Generating Station		
Date:	December 9 and 10, 1999	Area:	216.00 ft^2
Unit No:	7	No. Test Ports:	5
Length:	13.5	Tests Points per Port:	5
Width:	16	Distance Between Ports:	3.2 Feet
Duct No:	Precipitator Outlet	Distance Between Points:	2.5 Feet

UNIT 8



Side View



Top View

D = Equivalent Diameter

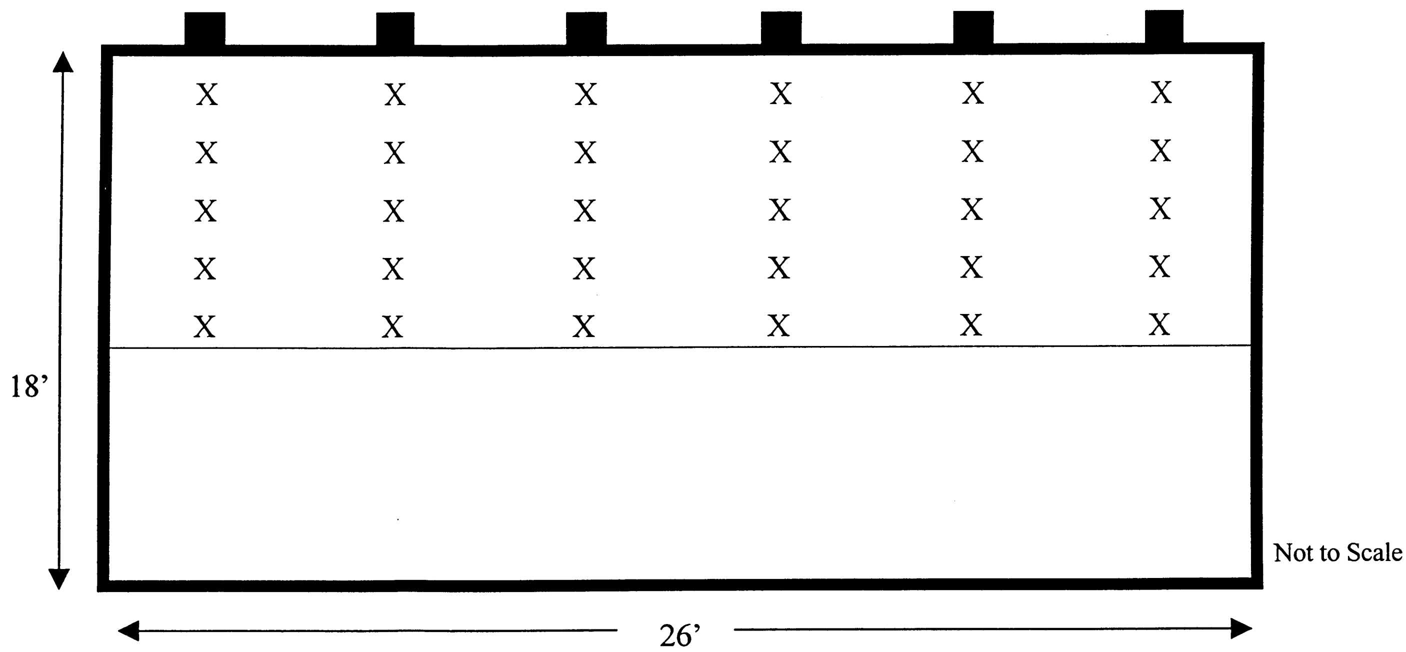
$$D = \frac{2 \times L \times W}{L + W}$$

$$D = \frac{2 \times 18 \times 26}{18 + 26}$$

$$D = 21.3$$

Not to Scale

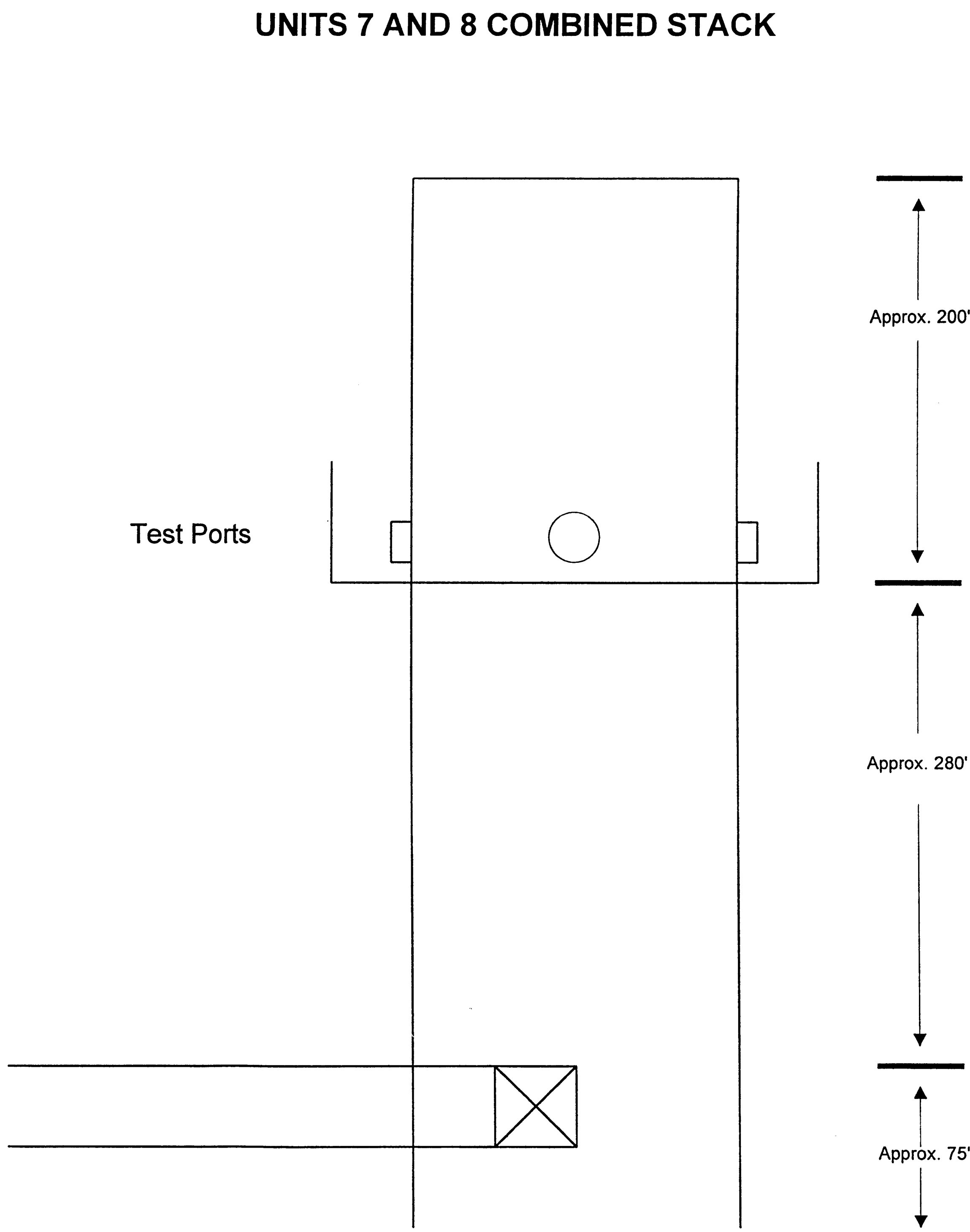
Equal Area Traverse For Rectangular Ducts (Inlet)



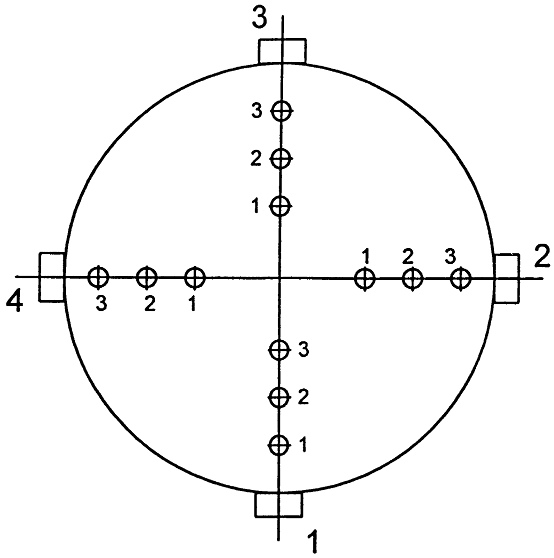
Job:	Northern Indiana Public Service Company Bailly Generating Station		
Date:	December 9 and 10, 1999	Area:	468.00 ft^2
Unit No:	8	No. Test Ports:	6
Length:	18 Feet	Tests Points per Port:	5
Width:	26 Feet	Distance Between Ports:	4.3 Feet
Duct No:	Precipitator Outlet	Distance Between Points:	*

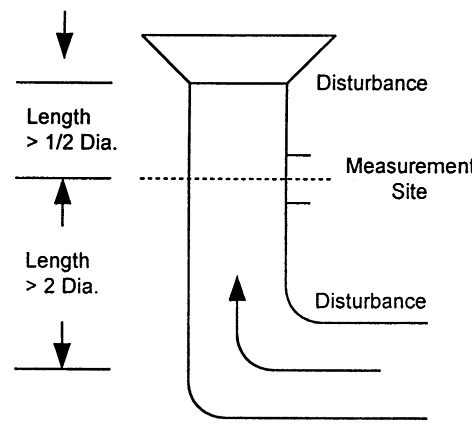
* A 12-foot probe was utilized due to the depth of the duct and port length

Figure 2-3 Schematic of the Bailly Generating Station Outlet Sampling Location



EQUAL AREA TRAVERSE FOR ROUND DUCTS (OUTLET)





Job:	Northern Indiana Public Service Company Bailly Generating Station
Date:	December 9 and 10, 1999
Unit No:	7 and 8
Duct No:	Stack
Duct Diameter:	33 Feet
Duct Area:	855.2986 Square Feet
No. Points Across Diameter:	6
No. of Ports:	4
Port Length:	66 Inches

3.0 SUMMARY AND DISCUSSION OF TEST RESULTS

3.1 Objectives and Test Matrix

The purpose of the test program was to quantify mercury emissions from this unit. This information will assist the USEPA Administrator in determining whether it is appropriate and necessary to regulate emissions of Hazardous Air Pollutants (HAPs) from electric utility steam generating units. The specific objectives, in order of priority were:

- Compare mass flow rates of mercury at the three sampling locations (fuel, inlet (two precipitator outlets), and common scrubber stack).
- Measure speciated mercury emissions at the outlet.
- Measure speciated mercury concentrations at the inlet of the last air pollution control device.
- Measure mercury and chlorine content from the fuel being used during the testing.
- Measure the oxygen and carbon dioxide concentrations at the inlet and the outlet.
- Measure the volumetric gas flow at the inlet and the outlet.
- Measure the moisture content of the flue gas at the inlet and the outlet.
- Provide the above information to the USEPA for use in establishing mercury emission factors for this type of unit.

The test matrix is presented in Table 3-1. The table shows the testing performed at each location, methodologies employed and responsible organization.

Table 3-1
TEST MATRIX FOR THE NIPSCO - BAILLY GENERATING STATION

Sampling Location	No. of Runs	Parameters	Sampling Method	Sample Run Time (min)	Analytical Method	Analytical Laboratory
Outlet	3	Speciated Hg	Ontario Hydro	120	EPA SW846 7470	TEI
Outlet	3	Moisture	EPA 4	120	Gravimetric	Mostardi Platt
Outlet	3	Flow	EPA 1 & 2	120	Pitot Traverse	Mostardi Platt
Outlet	3	O_2/CO_2	EPA 3	120	Orsat	Mostardi Platt
Inlet	3 at each	Speciated Hg	Ontario Hydro	120	EPA SW846 7470	TEI
Inlet	3 at each	Moisture	EPA 4	120	Gravimetric	Mostardi Platt
Inlet	3 at each	Flow	EPA 1 & 2	120	Pitot Traverse	Mostardi Platt
Inlet	3 at each	O_2/CO_2	EPA 3	120	Orsat	Mostardi Platt
Fuel Feeders	3	Hg, Cl in Fuel	Grab	1 Sample Per Feeder Per Run	ASTM D3684 (Hg) ASTM D4208 (Cl)	CTE

3.2 Field Test Changes and Problems

There were no field changes or problems encountered during this test program.

3.3 Presentation of Results

3.3.1 Mercury Mass Flow Rates

The mass flow rates of mercury determined at each sample location are presented in Table 3-2.

Table 3-2
SUMMARY OF RESULTS*

Sample Location	Elemental Mercury (lb/hr)	Oxidized Mercury (lb/hr)	Particle-Bound Mercury (lb/hr)	Total Mercury (lb/hr)
Fuel				
Run 1				0.02701
Run 2				0.03029
Run 3				0.02443
Average				**0.02724**
Scrubber Inlet				
Run 1	0.01278	0.01549	0.00019	0.02847
Run 2	0.01418	0.01047	0.00027	0.02491
Run 3	0.01172	0.01457	0.00032	0.02660
Average	**0.01290**	**0.01351**	**0.00026**	**0.02667**
Common Stack				
Run 1	0.01021	0.00128	0.00000	0.01149
Run 2	0.00949	0.00112	0.00000	0.01061
Run 3	0.00986	0.00135	0.00001	0.01122
Average	**0.00986**	**0.00125**	**0.00000**	**0.01111**

* Results are given as the sum of Units 7 and 8.

3.3.2 Comparison of Volumetric Flow Rate

Volumetric flow rate is a critical factor in calculating mass flow rates. Ideally, the volumetric flow rate (corrected to standard pressure and temperature) measured at the inlet to the control device should be the same as that measured at the stack, which should be the same as that measured by the CEMS. At this test location, the inlet to the control device is the combined flow rates from the precipitator outlets of Units 7 and 8. A comparison of the three locations on a thousand standard cubic foot per minute basis (KSCFM) is given in Table 3-3.

Table 3-3 COMPARISON OF VOLUMETRIC FLOW RATE DATA – KSCFM					
	Precipitator Outlets				
Run No.	Unit 7	Unit 8	Inlet	Stack	Stack CEMS
Run 1	406.7	1142.5	1549.2	1451.0	1578.3
Run 2	409.2	1151.5	1560.7	1451.0	1619.6
Run 3	414.3	1122.2	1536.5	1434.0	1685.2
Average	410.1	1138.7	1548.9	1445.3	1627.7

The measured volumetric flow rate (KSCFM) at the inlet was approximately 7% higher than that measured at the stack. The difference of the measured flow rate (KSCFM) at the stack was within 12% of that determined by the continuous emissions monitoring system (CEMS). This comparison demonstrates that all volumetric flow rate measurements for this test location were in agreement.

3.3.3 Individual Run Results

A detailed summary of results for each sample run at the two precipitator outlets and common stack test locations are presented in Tables 3-4, 3-5, and 3-6.

3.3.4 Process Operating Data

The process operating data collected during the tests is included in Appendix A. A summary of the coal usage and mass emission rate of mercury available from coal are presented in Table 3-7.

Table 3-4
UNIT 7 PRECIPITATOR OUTLET INDIVIDUAL RUN RESULTS

Test Run Number:	1	2	3	Average
Source Condition	Normal			
Fuel Factor, dscf/10^6 Btu	9854	9847	9796	
Date	12/9/99	12/10/99	12/10/99	
Start Time	13:10	8:41	11:55	
End Time	15:49	11:19	14:33	
Elemental Mercury:				
HNO_3-H_2O_2, ug detected	0.649	0.887	0.712	0.749
H_2SO_4-$KMnO_4$, ug detected	3.232	4.062	3.872	3.722
Reported, ug	3.881	4.949	4.584	4.471
ug/dscm	1.69	2.17	1.95	1.94
lb/hr	0.00235	0.00306	0.00277	0.00273
lb/10^{12} Btu	1.46	1.87	1.64	1.66
Oxidized Mercury:				
KCl, ug detected	5.09	4.78	4.54	4.80
Reported, ug	5.09	4.78	4.54	4.80
ug/dscm	2.21	2.10	1.93	2.08
lb/hr	0.00309	0.00295	0.00274	0.00293
lb/10^{12} Btu	1.91	1.81	1.62	1.78
Particle-bound Mercury:				
Filter, ug detected	0.017	0.027	0.263	0.102
HNO_3, ug detected	ND <0.004	ND <0.004	ND <0.004	ND <0.004
Reported, ug	0.017	0.027	0.263	0.102
ug/dscm	0.01	0.01	0.11	0.04
lb/hr	0.00001	0.00002	0.00016	0.00006
lb/10^{12} Btu	0.01	0.01	0.09	0.04
Total Inlet Speciated Mercury:				
ug/dscm	3.91	4.29	3.99	4.06
lb/hr	0.00545	0.00602	0.00567	0.00572
lb/10^{12} Btu	3.37	3.70	3.35	3.47
Average Gas Volumetric Flow Rate:				
@ Flue Conditions, acfm	599,953	604,793	613,697	606,148
@ Standard Conditions, dscfm	372,634	375,154	379,725	375,838
Average Gas Temperature, °F	320.3	318.0	319.6	319.3
Average Gas Velocity, ft/sec	46.29	46.67	47.35	46.77
Flue Gas Moisture, percent by volume	8.38	8.31	8.34	8.34
Average Flue Pressure, in. Hg	29.97	29.82	29.82	
Barometric Pressure, in. Hg	29.46	29.31	29.31	
Average %CO_2 by volume, dry basis	13.0	12.0	11.8	12.3
Average %O_2 by volume, dry basis	6.0	6.0	5.7	5.9
% Excess Air	39.00	38.34	35.45	37.60
Dry Molecular Wt. of Gas, lb/lb-mole	30.320	30.160	30.116	
Gas Sample Volume, dscf	81.257	80.373	83.094	
Isokinetic Variance	100.0	98.3	100.4	

Laboratory Analysis can be found in Appendix F.

Table 3-5
UNIT 8 PRECIPITATOR OUTLET INDIVIDUAL RUN RESULTS

Test Run Number:	1	2	3	**Average**
Source Condition		Normal		
Fuel Factor, dscf/10^6 Btu	9875	9865	9800	
Date	12/9/99	12/10/99	12/10/99	
Start Time	13:03	8:38	11:55	
End Time	15:45	11:12	14:29	
Elemental Mercury:				
HNO_3-H_2O_2, ug detected	0.980	1.180	1.230	1.130
H_2SO_4-$KMnO_4$, ug detected	7.292	7.552	6.132	6.992
Reported, ug	8.272	8.732	7.362	8.122
ug/dscm	2.67	2.81	2.32	2.60
lb/hr	0.01043	0.01112	0.00895	0.01017
lb/10^{12} Btu	2.23	2.36	2.06	2.22
Oxidized Mercury:				
KCl, ug detected	9.83	5.91	9.73	8.49
Reported, ug	9.83	5.91	9.73	8.49
ug/dscm	4.27	1.90	3.06	3.08
lb/hr	0.01240	0.00752	0.01183	0.01058
lb/10^{12} Btu	2.66	1.60	2.72	2.32
Particle-bound Mercury:				
Filter, ug detected	0.144	0.196	0.130	0.157
HNO_3, ug detected	ND <0.004	ND <0.004	ND <0.004	ND <0.004
Reported, ug	0.144	0.196	0.130	0.157
ug/dscm	0.06	0.06	0.04	0.06
lb/hr	0.00018	0.00025	0.00016	0.00020
lb/10^{12} Btu	0.04	0.05	0.04	0.04
Total Inlet Speciated Mercury:				
ug/dscm	7.01	4.77	5.42	5.73
lb/hr	0.02302	0.01889	0.02093	0.02095
lb/10^{12} Btu	4.93	4.01	4.81	4.58
Average Gas Volumetric Flow Rate:				
@ Flue Conditions, acfm	1,772,660	1,748,803	1,745,014	1,755,492
@ Standard Conditions, dscfm	1,042,882	1,057,156	1,031,006	1,043,681
Average Gas Temperature, °F	359.7	338.3	357.4	351.8
Average Gas Velocity, ft/sec	63.13	62.28	62.14	62.52
Flue Gas Moisture, percent by volume	8.72	8.19	8.13	8.35
Average Flue Pressure, in. Hg	29.94	29.79	29.79	
Barometric Pressure, in. Hg	29.46	29.31	29.31	
Average %CO_2 by volume, dry basis	12.4	12.4	12.5	12.4
Average %O_2 by volume, dry basis	5.5	5.6	6.5	5.9
% Excess Air	34.30	34.90	43.67	37.62
Dry Molecular Wt. of Gas, lb/lb-mole	30.205	30.208	30.260	
Gas Sample Volume, dscf	109.345	109.817	112.177	
Isokinetic Variance	100.0	99.1	103.8	

Laboratory Analysis can be found in Appendix F.

Table 3- 6
COMMON STACK INDIVIDUAL RUN RESULTS

Test Run Number:	**1**	**2**	**3**	**Average**
Source Condition	Normal			
Fuel Factor, dscf/10^6 Btu	9864	9856	9798	
Date	12/9/99	12/10/99	12/10/99	
Start Time	13:10	8:37	11:55	
End Time	15:49	11:11	14:34	
Elemental Mercury:				
HNO_3-H_2O_2, ug detected	0.754	0.342	0.380	0.492
H_2SO_4-$KMnO_4$, ug detected	6.492	6.332	6.472	6.432
Reported, ug	7.246	6.674	6.852	6.924
ug/dscm	2.22	2.04	2.16	2.14
lb/hr	0.01021	0.00949	0.00986	0.00986
lb/10^{12} Btu	2.06	1.89	1.99	1.98
Oxidized Mercury:				
KCl, ug detected	0.906	0.788	0.940	0.878
Reported, ug	0.906	0.788	0.940	0.878
ug/dscm	0.28	0.24	0.30	0.27
lb/hr	0.00128	0.00112	0.00135	0.00125
lb/10^{12} Btu	0.26	0.22	0.27	0.25
Particle-bound Mercury:				
Filter, ug detected	<0.003	<0.003	0.006	<0.004
HNO_3, ug detected	ND <0.004	ND <0.004	ND <0.004	ND <0.004
Reported, ug	0.001	0.001	0.006	0.003
ug/dscm	0.00	0.00	0.00	0.00
lb/hr	0.00000	0.00000	0.00001	0.00000
lb/10^{12} Btu	0.00	0.00	0.00	0.00
Total Outlet Speciated Mercury:				
ug/dscm	2.50	2.28	2.46	2.42
lb/hr	0.01149	0.01061	0.01122	0.01111
lb/10^{12} Btu	2.31	2.11	2.26	2.23
Average Gas Volumetric Flow Rate:				
@ Flue Conditions, acfm	1,655,988	1,661,134	1,643,117	1,653,413
@ Standard Conditions, dscfm	1,226,094	1,240,616	1,218,014	1,228,241
Average Gas Temperature, °F	130.1	129.0	129.5	129.5
Average Gas Velocity, ft/sec	32.27	32.37	32.02	32.22
Flue Gas Moisture, percent by volume	15.5*	14.50	15.06	14.78
Average Flue Pressure, in. Hg	29.30	29.15	29.15	
Barometric Pressure, in. Hg	29.26	29.11	29.11	
Average %CO_2 by volume, dry basis	12.0	12.2	12.0	12.1
Average %O_2 by volume, dry basis	7.0	7.0	7.0	7.0
% Excess Air	48.67	48.84	48.67	48.72
Dry Molecular Wt. of Gas, lb/lb-mole	30.200	30.232	30.200	
Gas Sample Volume, dscf	115.033	115.360	111.918	
Isokinetic Variance	102.1	101.2	101.3	

* Theoretical maximum moisture content - the gas stream was supersaturated.

Laboratory Analysis can be found in Appendix F.

Table 3-7
UNIT 7 - COAL USAGE RESULTS

Test Run Number:	**1**	**2**	**3**	**Average**
Date	12/9/99	12/10/99	12/10/99	
Start Time	13:10	8:37	11:55	
End Time	15:49	11:11	14:34	
Coal Properties:				
Carbon, % dry	73.34	73.22	72.92	73.16
Hydrogen, % dry	4.79	4.85	4.78	4.81
Nitrogen, % dry	1.27	1.26	1.23	1.25
Sulfur, % dry	3.05	2.82	2.86	2.91
Ash, % dry	8.65	8.79	9.29	8.91
Oxygen, % dry (by difference)	8.90	9.06	8.92	8.96
Volatile, % dry	38.41	37.66	37.44	37.84
Moisture, %	12.37	13.53	13.21	13.04
Heat Content, Btu/lb dry basis	12936	12927	12931	12931
F_d Factor O_2 basis, dscf/10^6 Btu	9854	9847	9796	9832
F_c Factor CO_2 basis, scf/10^6 Btu	1820	1818	1810	1816
Chloride, ug/g dry	544	454	553	517
Mercury, ug/g dry	0.05	0.05	0.05	0.05
Coal Consumption:				
Feeder 1, lbs/hr	35787	36789	35623	
Feeder 2, lbs/hr	41042	39026	38000	
Feeder 3, lbs/hr	43669	44763	43472	
Feeder 4, lbs/hr	43669	35526	34906	
Total Raw Coal Input, lbs/hr	164167	156104	152001	157424
Total Coal Input, lbs/hr dry	143860	134983	131922	136921
Total Mercury Available in Coal:				
Mercury, lbs/hr	0.00719	0.00675	0.00660	0.00685
Mercury, lbs/10^{12} Btu	3.87	3.87	3.87	3.87

Laboratory Analysis can be found in Appendix F.

Table 3- 8
UNIT 8 - COAL USAGE RESULTS

Test Run Number:	1	2	3	Average
Date	12/9/99	12/10/99	12/10/99	
Start Time	13:10	8:37	11:55	
End Time	15:49	11:11	14:34	
Coal Properties:				
Carbon, % dry	71.18	71.23	71.79	71.40
Hydrogen, % dry	5.01	5.07	4.96	5.01
Nitrogen, % dry	1.33	1.08	1.19	1.20
Sulfur, % dry	3.22	3.27	2.32	2.94
Ash, % dry	8.99	8.93	10.15	9.36
Oxygen, % dry (by difference)	10.27	10.42	9.59	10.09
Volatile, % dry	34.94	41.13	39.04	38.37
Moisture, %	15.31	15.41	15.90	15.54
Heat Content, Btu/lb dry basis	12602	12636	12752	12663
F_d Factor O_2 basis, dscf/10^6 Btu	9875	9865	9800	9847
F_c Factor CO_2 basis, scf/10^6 Btu	1813	1809	1807	1810
Chloride, ug/g dry	811	462	877	717
Mercury, ug/g dry	0.08	0.09	0.07	0.08
Coal Consumption:				
Feeder 1, lbs/hr	29783	33640	36835	
Feeder 2, lbs/hr	37373	37400	36987	
Feeder 3, lbs/hr	37337	44200	36949	
Feeder 4, lbs/hr	33795	36920	36873	
Feeder 5, lbs/hr	44458	44520	43975	
Feeder 6, lbs/hr	37120	37480	37101	
Feeder 7, lbs/hr	35205	37480	37025	
Feeder 8, lbs/hr	37446	37520	37101	
Total Raw Coal Input, lbs/hr	292517	309160	302846	301508
Total Coal Input, lbs/hr dry	247733	261518	254693	254648
Total Mercury Available in Coal:				
Mercury, lbs/hr	0.01982	0.02354	0.01783	0.02039
Mercury, lbs/10^{12} Btu	6.35	7.12	5.49	6.32

Laboratory Analysis can be found in Appendix F.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Test Methods

4.1.1 Speciated mercury emissions

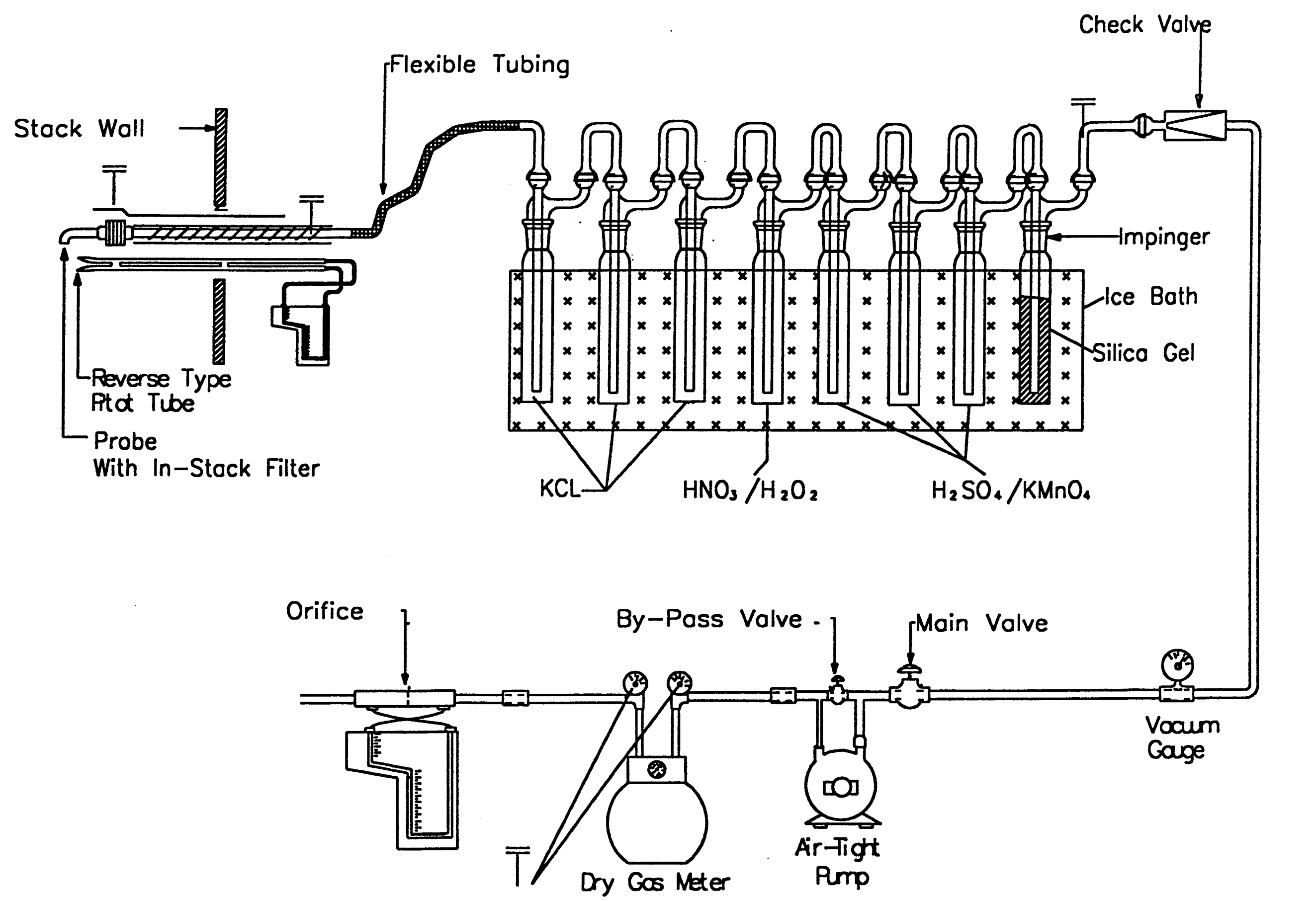
Speciated mercury emissions were determined via the draft "Standard Test Method for Elemental, Particle-Bound, and Total Mercury in Flue Gas Generated from Coal-Fired Stationary Sources (Ontario-Hydro Method)", dated July 7, 1999.

The in-stack filtration (Method 17) configuration was utilized at the precipitator outlet test locations. The out-of-stack filtration (Method 5) configuration was utilized at the common stack. Figures 4-1 and 4-2 are schematics of the Ontario-Hydro sampling trains.

Figure 4-3 illustrates the sample recovery procedure. The analytical scheme was per Section 13.3 of the Ontario-Hydro Method.

Speciated Mercury Sampling Train Equipped with In-Stack Filter

Ontario Hydro Method



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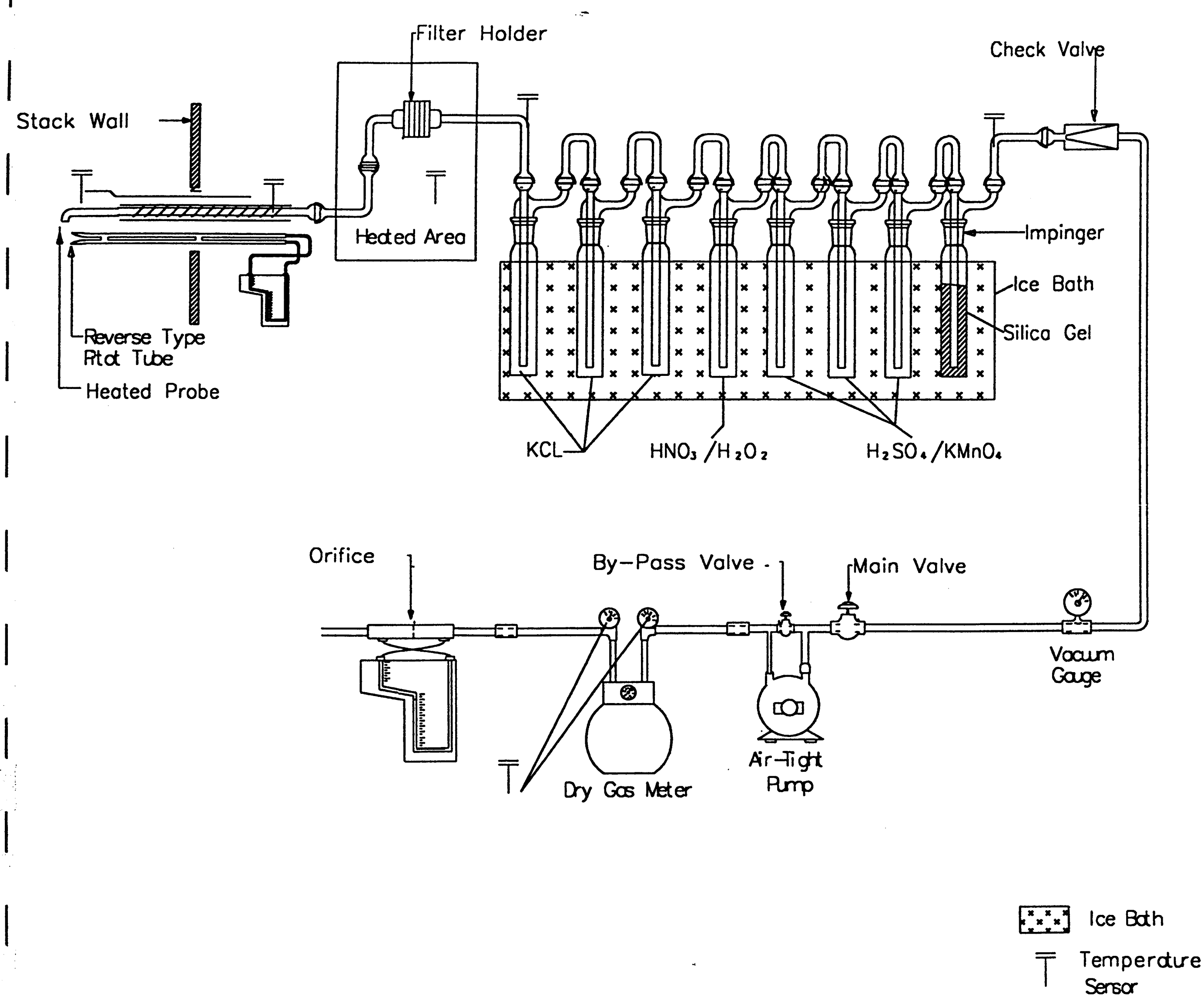
Speciated Mercury Sampling Train Equipped with Out-of-Stack Filter

Ontario Hydro Method



Mostardi Platt

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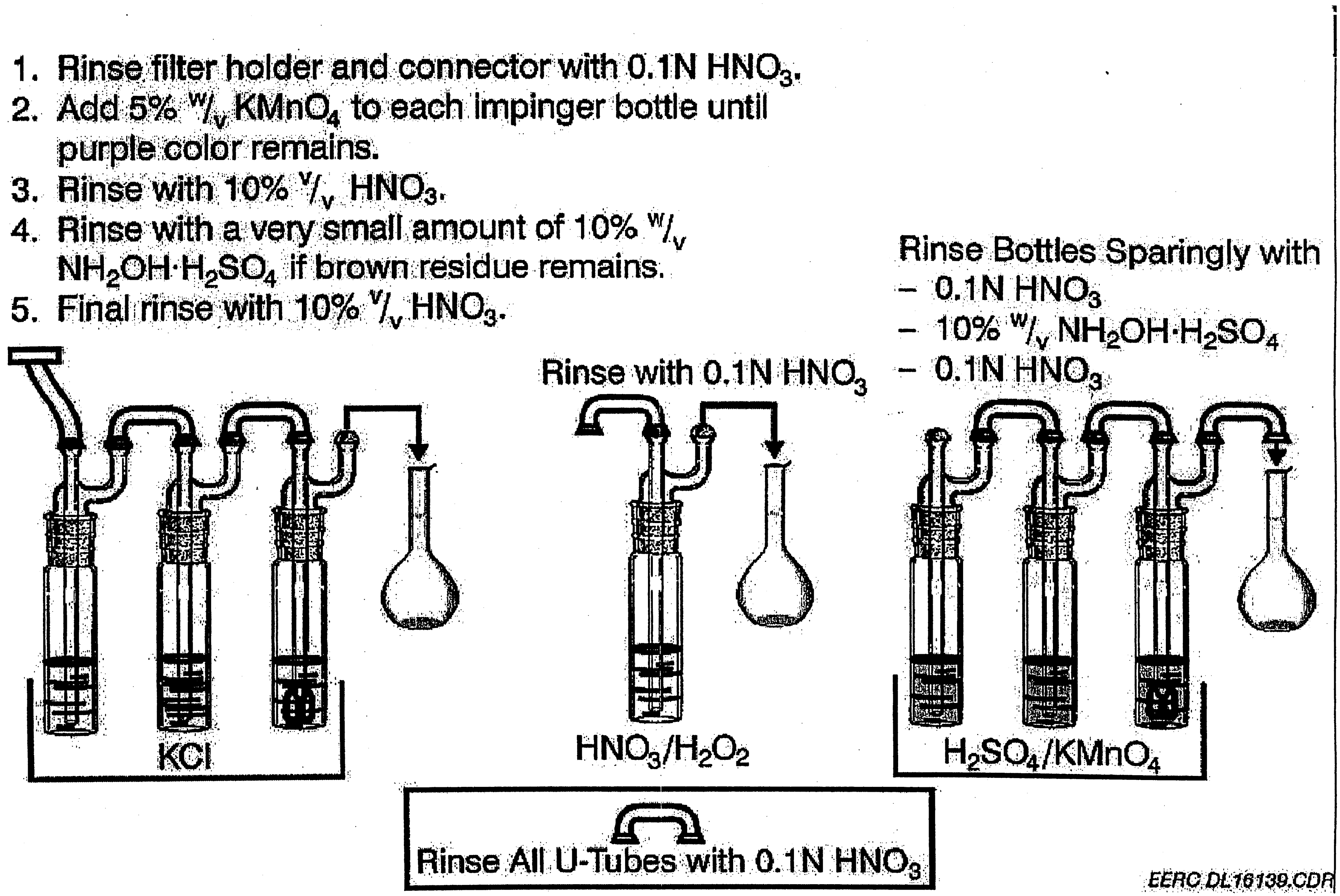

Figure 4-3 Sample Recovery Scheme for Ontario-Hydro Method Samples

4.1.2 Fuel samples

Fuel samples were collected by composite sampling. Three samples were collected at equally spaced intervals during each speciated mercury sampling run. Each set of three samples was composited into a single sample for each sample run. Sample analysis was conducted according to the procedures of ASTM D3684 and ASTM D4208.

4.2 Procedures for Obtaining Process Data

Plant personnel were responsible for obtaining process-operating data. The process data presented in Table 3-6 was continuously monitored by the facility. Process data was averaged over the course of each sample run.

4.3 Sample Identification and Custody

The chain-of-custody for all samples obtained for analysis can be found in Appendix E.

5.0 INTERNAL QA/QC ACTIVITIES

All sampling, recovery and analytical procedures conform to those described in the site specific test plan. The precision and accuracy related to the speciated fractions are given in Appendix F. The accuracy of the results is given as CPI (recovery of an independent standard obtained from CPI) and the precision of the results is given as %RSD (relative standard deviation). All resultant data was reviewed by the laboratory and Mostardi Platt per the requirements listed in the QAPP and were determined to be valid except where noted below.

5.1 QA/QC Problems

Reagent blanks are required to be less than ten times the detection limit or ten percent of the sample values found. Train blanks are required to be less than thirty percent of the sample values found. Reagent and train blanks that did not meet these requirements are identified in Section 5.2. The test results for these samples have been qualified per the QAPP.

5.2 QA Audits

5.2.1 Reagent Blanks

As required by the method, blanks were collected for all reagents utilized. The results of reagent blank analysis are presented in Table 5-1.

Table 5-1 REAGENT BLANK ANALYSIS				
Sample ID #	**Sample Fraction**	**Contents**	**Mercury (μg)**	**Detection Limit (μg)**
061	Front-half	0.1N HNO_3/Filter	< 0.004	0.004
062	1 N KCl	1 N KCl	< 0.003	0.003
063	HNO_3/H_2O_2	HNO_3/H_2O_2	0.030	0.008
064	$KMnO_4/H_2SO_4$	$KMnO_4/H_2SO_4$	0.008	0.003

5.2.2 Blank Trains

As required by the method, blank trains were collected at both the inlet and stack sampling locations. These trains were collected on December 9 and 10, 1999. The results of blank train analysis are presented in Table 5-2.

Table 5-2 BLANK TRAIN ANALYSIS				
Sample ID #	**Sample Fraction**	**Contents**	**Mercury (μg)**	**Detection Limit (μg)**
058, 059, 060	Front-half	Filter	0.215	0.002
055, 056, 057	Front-half	Filter	0.974	0.002
046*	KCl impingers	Impingers/rinse	0.615	0.03
049	KCl impingers	Impingers/rinse	0.186	0.03
052	KCl impingers	Impingers/rinse	0.120	0.03
047*	HNO_3-H_2O_2 impingers	Impingers/rinse	0.209	0.04
050*	HNO_3-H_2O_2 impingers	Impingers/rinse	0.233	0.04
053	HNO_3-H_2O_2 impingers	Impingers/rinse	0.293	0.04
048	$KMnO_4/H_2SO_4$ impingers	Impingers/rinse	0.062	0.03
051	$KMnO_4/H_2SO_4$ impingers	Impingers/rinse	< 0.03	0.03
054	$KMnO_4/H_2SO_4$ impingers	Impingers/rinse	< 0.03	0.03

* Train blank did not meet QAPP criteria - Data qualified.

5.2.3 Field Dry Test Meter Audit

The field dry test meter audit described in Section 4.4.1 of Method 5 was completed prior to the test. The results of the audit are presented in Appendix C.